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History and status of the avifauna of Isla Guadalupe, Mexico

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Abstract. Since 1954, renewed interest in Isla Guadalupe, stimulated by the research of the late C. L. Hubbs, has resulted in much new information on the avifauna. In this paper we review the status of the birdlife through 1982, provide an historical review of the research, including information on the timing and extent of the many expeditions, and provide a bibliography.

Resumen. Desde 1954, interés renovado en la Isla Guadalupe, promovido por las investigaciones del Dr. C. L. Hubbs, ha resultado en mucha nueva información sobre la avifauna. En esta presentación detallamos lo conocido sobre la historia natural de los aves hasta 1982, damos un resumen histórico sobre las investigaciones, incluyendo información sobre el estacionamiento y duración de las expediciones y ofrecemos una bibliografía.

INTRODUCTION

Because of its unique plant and animal life, Isla Guadalupe, Mexico, has fascinated biologists since the time of its scientific "discovery" in 1875. This rugged and remote volcanic island, 220 miles south of the Mexico-United States boundary and 160 miles west of the peninsula of Baja California, was the home of ten endemic species or subspecies of birds (an eleventh has recently been proposed). But the history of the birdlife "is a sad one of reduction and extermination through destruction of habitat by feral goats, predation by introduced house cats, and regrettably, some excess of zeal by collectors" (Howell and Cade 1954: see also Huey 1924, 1925), and many of the endemics are gone.

Much has been written about the avifauna, and the history of some of the extinct forms has been well documented. Ridgway (1876), Bryant (1887a), Thayer and Bangs (1908) and Hanna (1925) provided comprehensive reviews of the birdlife and these were made current by Howell and Cade in 1954. Since then, sufficient new information has been obtained to prompt a further compilation.

For a description of the island and its general ecological settings and geology see Howell and Cade (1954), Lewis (1971), and Johnson (1953). A good summary is provided by Lindsay (1966:2); who wrote: "Guadalupe Island is about 22 miles long from north to south, and four to six miles wide over most of its length. The highest part is at the north end, where magnificent sheer cliffs tower over the sea or narrow beaches of cobbles and sand. The central part is a plateau sloping toward the south end, but the whole island is very rugged. Most of the base rock is red lava, and several of the lesser peaks are cinder cones. Recent research has shown that the oldest lava flows occurred about 7,000,000 years ago."

Most of the island is devoid of vegetation. A remnant of a formerly large cypress

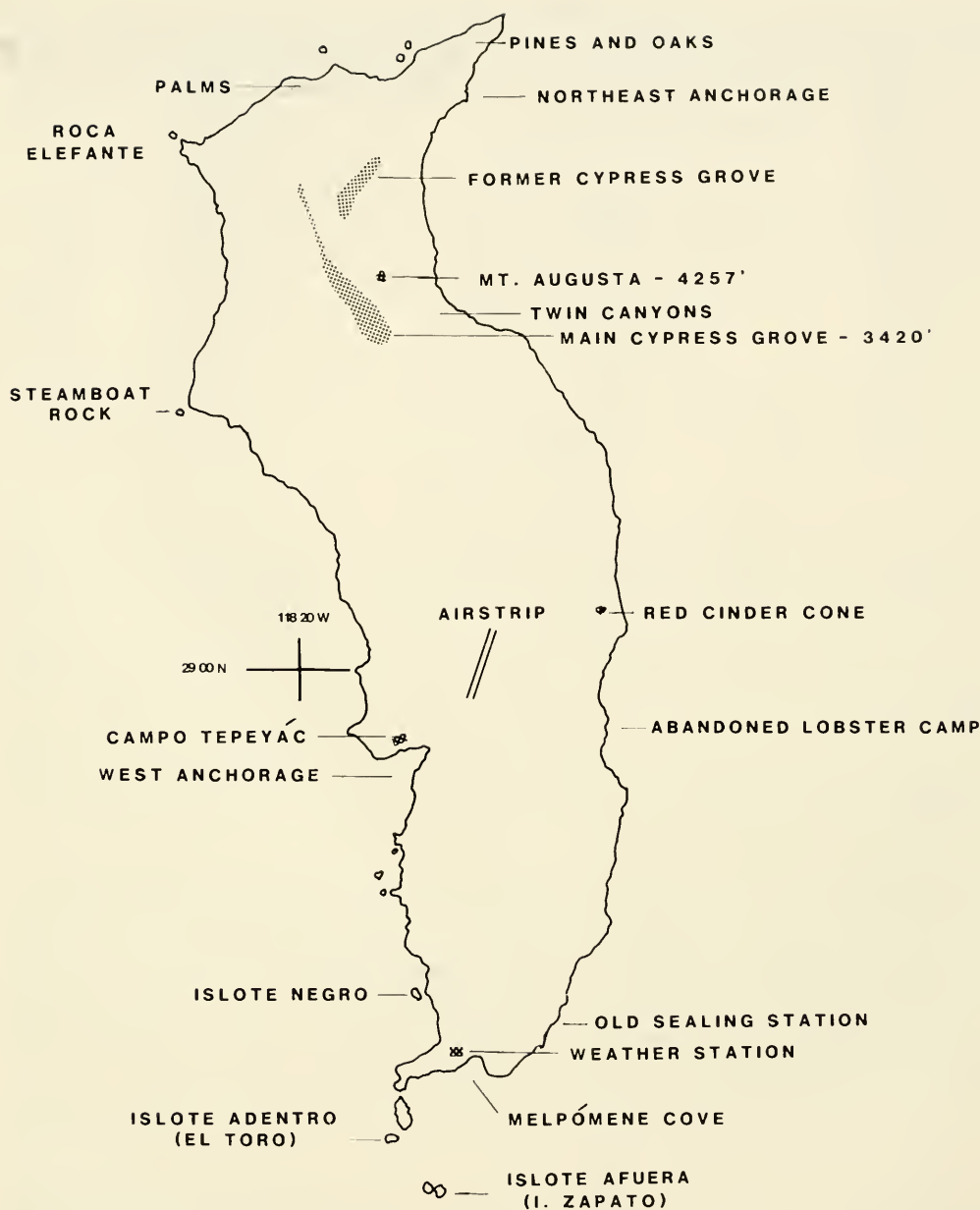


FIGURE 1. Isla Guadalupe, showing major localities and forested areas mentioned in this report.

been so thorough that Bryant was unable to discover any additional endemic landbirds, but he did amass a number of unusual observations (Bryant 1887a). More importantly, he discovered the Guadalupe Petrel (*Oceanodroma macrodactyla*), the first endemic seabird to be recognized (Bryant 1887b).

In the last decade of the 19th century, several expeditions made brief stops at Guadalupe. A. W. Anthony made several trips and was the first to report the destruction of biota by feral goats (Anthony 1901). Within a few years many of the endemic birds were extinct. The last report of a Guadalupe Caracara (*Polyborus plancus lutosus*) was made by Rollo Beck, who collected nine in December 1900. An expedition from the

TABLE 2. Expeditions to Guadalupe Island by C. L. Hubbs.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total days
1946								■					2
1950	■												8
1954											■		8
1955						■							7
1956								■	■				5
1957		■		■						■		■	26
1958				■									9
1960	■												6
1963				■									9
1964											■		6
1965			■										7
1966				■									8
1967					■								9
1969		■											5
1970	■			■									12
1971					■								6

Thayer Museum, including W. W. Brown, spent two months on the island in the spring of 1906. After scouring the island, they declared the Guadalupe Wren (*Thryomanes bewickii brevicauda*) and Guadalupe Towhee (*Pipilo erythrophthalmus consobrinus*) extinct (Thayer and Bangs 1908), and predicted the quick demise of the Guadalupe Flicker (*Colaptes auratus rufipileus*). Yet, despite intense predation by cats, the Guadalupe Petrel persisted “in large numbers.” Only six years later, however, in 1912, Beck collected two downy chicks, the last known examples (Davidson 1928).

After the basic collections had been made, and the extinction of the endemics had been documented, interest in the island lagged. Some ornithologists continued to visit it (often en route to more exciting localities) in the 1920s and 1930s (e.g., Hanna 1925), but little new information resulted.

Commencing in the 1940s and continuing through the early 1970s studies by Carl L. Hubbs and his many colleagues renewed interest in Guadalupe. Between 1946 and 1971, Hubbs made 21 expeditions to the island (Table 2). Hubbs discovered that small islets at the southern end of the main island were important seabird colonies. In addition to initiating population studies on seabirds, he reported the apparently distinctive summer and winter populations of Leach’s Storm-Petrels (Hubbs 1960) that have received much subsequent attention (Crossin 1974, Ainley 1980, 1983, Bourne and Jehl 1982). He also discovered the only known fossil locality on the island (Pleistocene), which has yielded the remains of a few seabirds (Hubbs and Jehl 1976).

In 1953, T. R. Howell and T. J. Cade spent five days on the island, on one of Hubbs’ expeditions. Their findings (Howell and Cade 1954, 1955) resulted in the first discussion of the birdlife in several decades. Additional work by the Pacific Ocean Biological Survey Program (POBSP) in the late 1960s and early 1970s (DeLong and Crossin MS, Brownell MS, Crossin MS, 1974) revealed much about the nesting seabirds.

Since the late 1960s we have each had occasion to visit Guadalupe several times. Our observations, and those of many other biologists who have generously contributed data (Table 3), and the voluminous field notes of the late Carl L. Hubbs provide the basis for this report. Note, however, that as with earlier studies nearly all of the recent work has been concentrated in late winter through early summer and that the fall season, with one exception, is unrepresented. We have attempted to make the report comprehensive and current, and to provide a complete ornithological bibliography. This compilation was stimulated in part by a request, for planning purposes, from the Mexican government, through Dr. Martín Gonzáles. Because prospects of additional surveys in 1982 and 1983 failed to materialize, we are making the report available now. We acknowledge, however, that much remains to be learned before our knowledge of the present avifauna is adequate.

TABLE 3. Recent ornithological observations on Isla Guadalupe, Mexico.

Year	Month	Observers
1965	27-31 Jan	K. L. Kenyon
1967	26, 27, 30 Apr. 1-4 May, 21-24 Oct	R. L. DeLong and R. S. Crossin
1968	17-22 Apr, 20-23 Jun, 28-29 Jun	R. L. Brownell, R. S. Crossin, R. L. DeLong
1969	21-23 Feb	J. R. Jehl, Jr.
1970	19-27 Jan, 12-18 Apr	J. R. Jehl, Jr.
1971	15 Mar, 17-23 May	J. R. Jehl, Jr.
1972	mid Dec	K. Briggs
1973	22 Nov-26 Dec	E. Mirsky
1975	12-13 Jul	J. R. Jehl, Jr.
1977	20 Jun-13 Jul	M. Pierson and M. Riedman
1978	9-20 Feb 16 Apr 17-18 Dec	M. Pierson, E. Chu et al. W. T. Everett K. Briggs
1979	24 Mar, 18 Apr	W. T. Everett
1980	4-5 May	W. T. Everett
1981	19-26 Aug	D. Duncan
1982	12-15 Feb, 4-6 Mar	R. Condit

ANNOTATED LIST OF SPECIES

In the following section we provide synoptic information on all species of birds recorded on Guadalupe Island and in waters immediately adjacent (within approximately 15 km) of the island. We include information on many species of seabirds, which were not considered by Howell and Cade (1954). Nomenclature follows the AOU Check-list (1983), except for *Pluvialis fulva* (see Connors 1983). The following abbreviations are used: AMNH, American Museum of Natural History; CAS, California Academy of Sciences; HSWRI, Hubbs-Sea World Research Institute; LACMNH, Los Angeles County Museum of Natural History; SDNHM, San Diego Natural History Museum; UCLA, University of California Los Angeles.

Arctic Loon (*Gavia arctica*)

Uncommon winter visitor. Palmer found an adult washed ashore on 20 May 1875 (Ridgway 1876). Hubbs collected one on 13 February 1957 and saw two others on his expedition (8-15 February 1957), and Mirsky (MS) observed one on 23 November 1973.

Pied-billed Grebe (*Podilymbus podiceps*)

Accidental. Hubbs collected one on 27 October 1957; location of specimen unknown.

Eared Grebe (*Podiceps nigricollis*)

Considered accidental by Howell and Cade (1955) on the basis of a specimen reported by Rothschild and Hartert (1902). There are four subsequent reports. Hubbs



FIGURE 2. Guadalupe Storm-Petrel (*Oceanodroma macrodactyla*). Photograph of a mount in the Field Museum of Natural History, Chicago.

collected two on 12 February 1957 (LACMNH) and reported taking another on 30 October 1957; Mirsky (MS) reported one on 23–25 November 1973.

Western Grebe (*Aechmophorus occidentalis*)

Accidental. Two reports by Hubbs of single birds on 12 November 1954 and 17 December 1957.

Short-tailed Albatross (*Diomedea albatrus*)

Probably regular in the area until the late 19th century. Bryant (1889) reported five between Ensenada and Guadalupe in April 1886. Now very rare and not reported in Baja California for many decades.

Black-footed Albatross (*Diomedea nigripes*)

Uncommon but regular near the island through most of the year, with many sight records from September to June.

Laysan Albatross (*Diomedea immutabilis*)

This species is a rare but regular wanderer to Baja California. R. Wisner observed a single bird about 3 km off the north end of the island on 22 April 1958, and R. Pitman saw one 90 km to the northeast on 4 January 1980. Anthony (1898b) took a specimen between San Gerónimo and Guadalupe islands in March 1897.

Northern Fulmar (*Fulmarus glacialis*)

Irregular visitor in winter. Mirsky (MS) reported one on 6–7 December 1973. This species reaches the latitude of central Baja California in flight years.

Cook's Petrel (*Pterodroma cookii*)

This species occurs regularly off the coast of Baja California (Jehl, *pers. obs.*). Two were seen on 11 April 1961, 100 km north of the island (Small 1961). Pitman saw one along with another unidentified *Pterodroma* within 15 km of Guadalupe on 11 October 1979.

Pink-footed Shearwater (*Puffinus creatopus*)

According to Grinnell (1928): "First definitely recorded by Gaylord . . . as seen by A. W. Anthony near Guadalupe Island, September 17, 1896." While this record may be correct—the species is a common migrant nearer shore—we suspect that it more likely pertains to the Black-vented Shearwater, which breeds locally.

Sooty Shearwater (*Puffinus griseus*)

Probably a regular visitor from April to October. Thayer and Bangs (1908) reported taking two specimens "near" the island in June 1906, and Pitman saw one on 4 January 1979.

Black-vented Shearwater (*Puffinus opisthomelas*)

This shearwater has long been known to breed at Guadalupe. Anthony (1900) reported it to be "rather common . . . in several parts of the island, but in no place was there any large colony. Their nests were all inaccessible owing to the nature of the sites selected, whether in natural holes in the lava or under large boulders, and no eggs were secured. A night was spent on the top of the island in a heavy cypress growth, about 4000 feet above the sea. Here the shearwaters were heard all night, their choking, gasping notes coming from all sides as they flew through this grove."

Hubbs discovered and for many years surveyed the colony on Islote Negro, which in the late 1960s and early 1970s contained 100–150 pairs (Jehl, *pers. obs.*, Crossin MS, Brownell MS). Crossin visited Islote Afuera on 22–23 June 1968 and found a colony of 150+ pairs. We suspect that there may be other colonies on the main island because in the early evening flocks of 500–2500 shearwaters, too many to be accommodated by known nesting areas, stage at the south end of the island.

The breeding season at Islote Negro can be outlined with some confidence. By late November single birds begin to occupy burrows. By early January pairs are commonly found and fresh eggs are present by 5 March (Hubbs field notes). The peak of the egg-laying season occurs in early April, when most burrows contain an egg, but may extend to late June (Jehl, *pers. obs.*; Crossin MS). Young are present as early as late April and in late June most burrows have a chick. There are no data for later in the fall. Crossin reported that the phenology of the Islote Afuera colony was somewhat later than at Islote Negro.

Leach's Storm-Petrel (*Oceanodroma leucorhoa*)

There has been much uncertainty about the historical status of storm-petrels at Guadalupe, much of which may never be fully resolved because the early literature is inconsistent, and because cats have eliminated most, if not all, storm-petrel colonies on the main island, whose location and species composition cannot be fully reconstructed. The complicated case of the Leach's Storm-Petrel is best treated chronologically.

In the winter and spring of 1885–86, W. E. Bryant was stranded on Guadalupe for nearly four months. Near the end of his stay he discovered storm-petrels nesting

among the pines and cypress trees at the northern end of the island. Bryant (1887a) reported these as Leach's Storm-Petrels (*Oceanodroma leucorhoa*), and recognized that they had a more deeply forked tail and a longer middle toe than other races. Bryant (1887b) then named these as a new race (*O. l. macrodactyla*), the Guadalupe Storm-Petrel, which the AOU (1889) elevated to species rank.

In 1889, C. H. Townsend secured a single small storm-petrel, which had the sides of the rump "whitish," at sea near Socorro Island, 1200 km SE of Guadalupe. He described it as a new species (*O. socorroensis*), guessing that it nested at Socorro Island (Townsend 1890).

A. W. Anthony visited Guadalupe in May 1892 and collected three nestling Guadalupe Storm-Petrels, but did not mention other species. In 1896, Anthony and H. A. Gaylord visited Guadalupe in mid-September. Anthony spent a night atop the island but reported no petrels of any species (Anthony 1898c). However, Gaylord (1897) stated: "Regarding the Petrels which breed on the island, the hunters told us that while doing some stone work in the region of the Petrel colony, they had found two different species. They described the Guadalupe Petrel and an entirely black one, which together with a wing found on the trail to the cypress grove makes it appear that *O. homochroa* is an inhabitant of the island."

In late March, Anthony collected a series of adult *macrodactyla*, along with a few eggs. That summer he returned and collected young, noting that *macrodactyla* leaves the colony by 10 June. On neither trip did he find other species in the colony, but in June he collected a storm-petrel with enlarged ova at sea 120 mi north of Guadalupe, which became the type of Kaeding's Petrel (*Oceanodroma kaedingi*). This new form was distinguished by its small size and white rump, but Anthony (1898a) noted that there was much variation in rump color. From observations at sea, Anthony (1898a) surmised that the range of *kaedingi* extended from the Revillagigedos to southern California and guessed (1898c) that its breeding grounds were on Guadalupe. Also, he reidentified the wing ascribed to *homochroa* in 1896 as belonging to *kaedingi* (Anthony 1898c).

H. B. Kaeding (1905), who accompanied the 1897 expedition, was the first to allege a common breeding area for *kaedingi* and *macrodactyla*. He wrote that "the breeding grounds of *kaedingi* are as yet unknown, but it is probable that the birds occupy the burrows of Guadalupe Petrels . . . after the breeding season of the former is closed." In late May 1906, W. W. Brown and H. W. Marsden visited the breeding grounds of the Guadalupe Storm-Petrel (Thayer and Bangs 1908); they found *O. macrodactyla* but no other species.

By this time most of the islands off Baja California had been surveyed and taxonomists began to re-evaluate the variation in the Leach's Storm-Petrel group (including Swinhoe's Storm-Petrel, *O. monorhis*, of the western Pacific), a process that still continues (e.g., von Berlepsch 1906, Emerson 1906, Godman 1907–1910, Oberholser 1917, Loomis 1918, van Rossem 1942, Austin 1952, Todd 1955, Palmer 1962, Crossin 1974, Ainley 1980, 1983, Bourne and Jehl 1982, Power and Ainley MS). The work was made difficult because of the petrels' discontinuous breeding range, the scarcity of specimens from breeding colonies, the great variability in some populations, and the lack of knowledge about the location of breeding grounds. The last point was illustrated by A. C. Bent (1922), who reported that "Mr. Anthony wrote me that on Guadalupe Island the Guadalupe Petrels breed early, April 20 or earlier, and that after they are through breeding the Kaeding Petrels use the same burrows." As Anthony was the most knowledgeable ornithologist regarding the petrels of the region no one questioned his perpetuation of Kaeding's (1905) idea, even though all expeditions to the nesting grounds of *macrodactyla* failed to report any other species as nesting, and despite the fact that the nesting grounds of *kaedingi* had yet to be discovered (e.g., Oberholser 1917, Grinnell 1918).

On 11–17 July 1922 Anthony (1925) returned to Guadalupe and visited the nesting area of *macrodactyla*. That species had disappeared, but the expedition did find numerous bodies of *kaedingi* that had been killed by cats or were impaled on cholla, and

even found a week-old chick (CAS no. 25561). Unfortunately, no data were published on precise localities. Hanna (1925) stated that *kaedingi* "lived among the loose rocks and in holes in the cliffs," whereas Anthony (1925) said that it "evidently" nested in high cliffs at the north end of the island. Regardless, the discovery of the chick (i) provided the first proof that a species other than *macrodactyla* nested on the main island, (ii) established the island as a breeding location for *kaedingi*, (iii) is in accord with recent data that *kaedingi* is a crevice nester (*macrodactyla* nested in burrows in forested areas), and (iv) shows that Anthony had no evidence of burrow-sharing between *macrodactyla* and *kaedingi*.

In 1950, Carl L. Hubbs discovered and began to study the Leach's Storm-Petrels nesting on small islets at the south end of the main island. Hubbs (1960) was the first to recognize that there were evidently two populations, a larger form with white rump that bred in winter and fledged young by April, and a smaller form with less white on the rump that began laying in June and fledged young in October or November. Surveys by the POBSP in June 1968 determined the summer population on Islote Negro at 4000 adults and on Islote Afuera at 3000 adults (Crossin MS, 1974). Jehl also found a nearly-grown chick on Gargoyle Rock in April 1970 and Huey (1952) reported a chick there in January 1950. Huey also reported that Hendrickson collected "a number of *Oceanodroma* petrels from rock crevices on the hillsides of Melpomene Cove, situated on the southern end of Guadalupe Island." We presume that small colonies remain to be discovered on the main island but none are known with certainty. Evidence of the persistence of one or more colonies there is provided by repeated observations of birds landing on ships at the north end of Guadalupe in late spring and summer (Jehl, *pers. obs.*, Anthony 1925, Huey 1930), as well as records of a few petrels flying over the north end of the island in May 1971 (Jehl 1972) and many near the cypress grove in August 1981 (R. Moran, D. Duncan, *pers. comm.*).

The correct nomenclature of the Guadalupe populations has been debated. Van Rossem (1942) pointed out that the type of *socorroensis* was a small bird of the Guadalupe population; since that name had priority, *kaedingi* was relegated to synonymy. When Hubbs (1960) found that two populations were present on Islote Negro, he referred to the summer breeders as *socorroensis* and the winter breeders as *kaedingi*. However, the situation is evidently even more complicated, because the summer birds are highly variable. Crossin (1974) reported that all birds nesting at Islote Negro were dark-rumped, while on Islote Afuera over 90% of the population was white-rumped. Recently, Ainley (1980) named the winter breeders as a new race, *cheimomnestes*, on grounds unconvincing to Bourne and Jehl (1982) but reaffirmed by Power and Ainley (MS).

In summary, Leach's Storm-Petrels breed commonly on islets at the southern end of Guadalupe Island. There is also strong presumptive evidence for the persistence or re-establishment of colonies near the north end and center of the main island. According to Power and Ainley (MS), the winter and summer populations on Islote Negro are temporally segregated and morphologically distinct. If so, their findings would require that the two populations be considered as distinct species, not subspecies. Yet, because of the lack of field work in the fall, neither Bourne and Jehl (1982) nor Crossin (1974: 174) were convinced that the populations are fully isolated temporally. Furthermore, because there are differences in coloration (at least) between summer populations breeding contemporaneously on I. Negro and I. Afuera, and because the morphological characters and breeding seasons are not known for the presumed colonies on the main island, the situation remains unclear. This is one of the most complicated cases of differentiation known in birds, and one that will require additional study.

Ashy Storm-Petrel (*Oceanodroma homochroa*)

A wing attributed to this species by Gaylord (1897) was reidentified as that of *O. leucorhoa* by Anthony (1898c). In Gaylord's original report (see above) the presence of an "entirely black" storm-petrel near the colony of *O. macrodactyla* on the main

island was alleged by "hunters." Probably these represented dark-rumped examples of the summer population of *O. l. socorroensis* or, less likely, wanderers of *O. l. chapmani* from the San Benito Islands. *O. homochroa* may occur off Baja California in winter, but the nearest breeding colony is on Los Coronados, 320 km to the north, and may consist of only 2–3 pairs (Jehl pers. obs.).

Wedge-rumped Storm-Petrel (*Oceanodroma tethys*)

A specimen obtained in 1950 was said to have been collected from a crevice on the side of Melpomene Cove, at the south end of the main island, which also included a downy young of *O. leucorhoa* (Huey 1952). However, the precise locality is not clear. Howell and Cade (1954) claimed it was collected on Gargoyle Rock at the end of the island, and Hubbs told Jehl the same thing. Jehl landed there in April 1970 and found a single chick of *O. leucorhoa*. There are no subsequent records although the species occurs regularly to southern Baja California (Jehl pers. obs., Pitman pers. comm.).

Black Storm-Petrel (*Oceanodroma melania*)

Kaeding (1905) reported this species near Guadalupe, but the observation could have pertained to any of several others. Anthony's (1898c) report, which implies that the species nests on Guadalupe Island, actually alludes to the nesting season of the species elsewhere.

Guadalupe Storm-Petrel (*Oceanodroma macrodactyla*)

This endemic and unusual storm-petrel (Fig. 2), originally described as a race of *O. leucorhoa* (Bryant 1887b), bred in soil burrows atop the main island, among the pines at the north end and in the cypress grove. Its status and history have most recently been reviewed by Jehl (1972). Both Howell and Cade (1954) and Greenway (1967) incorrectly cite the last report of the species, apparently overlooking the work of Davidson (1928), who corrected earlier errors and established August 1912 as the last acceptable record. A winter breeder, it laid by early March (Kaeding 1905) but sometimes as late as June, for Beck collected three chicks on 3 August 1912 (specimens in AMNH). Nothing is known about the ecology or distribution of this species at sea. Thoburn (1899) reported it as abundant about his ship at night in late June 1897, as it lay anchored at Guadalupe, and reported collecting several. If so, these would represent the only documented records of *macrodactyla* away from the breeding colonies, but we have been unable to locate any specimens and suspect that his reports refer to *O. leucorhoa*.

The Guadalupe Storm-Petrel was considered abundant in the colony as late as 1906 (Thayer and Bangs 1908), but was being preyed upon heavily by domestic cats. Davidson (1928), in declaring it to be extinct, based her conclusion on the negative results of the 1922 expedition by the California Academy of Sciences (Hanna 1925), which took place in mid-summer, after the main breeding season, and on the erroneous assumption that the CAS expedition of April 1925 (McLellan 1926) had carefully searched the breeding grounds. Jehl (1972) spent several nights listening for petrels in the early 1970's in the pine-oak woodlands atop the island, but did not visit the cypress grove, where the species also had nested. No thorough survey of the breeding grounds has been made at the appropriate season since 1906. The apparent persistence of *O. leucorhoa* on the main island despite predation by cats allows some hope that *macrodactyla* may still exist.

As noted above there is no acceptable evidence for the often-repeated contention that Guadalupe and Leach's storm-petrels ever bred in the same colonies. All evidence suggests that they used different habitats: *macrodactyla* burrowed in soil, *leucorhoa* nested in crevices. Further, the breeding season of *macrodactyla* probably overlapped that of the winter and summer forms of *leucorhoa*, so that sequential use of burrows would have been impossible.

Red-billed Tropicbird (*Phaethon aethereus*)

Probably regular in the area but the only records are of individual birds 25 and 37 km north of the island on 11 October 1979, and another slightly farther north on 7 January 1980 (Pitman).

Red-tailed Tropicbird (*Phaethon rubricauda*)

Anthony (1898*b*) reported collecting a specimen close to Guadalupe on 23 July 1897.

Brown Pelican (*Pelecanus occidentalis*)

There are two records, an immature individual reported by Anthony (1925), and a probable juvenile reported on 4 July 1977 (Pierson and Riedman, MS). This coastal species rarely wanders to deep waters beyond the continental shelf.

Double-crested Cormorant (*Phalacrocorax auritus*)

Probably a rare or accidental visitor, but its status requires verification. One was reported by Gaylord (1897) and Huey (1924) casually mentions the species as being present in 1923. Hubbs reported the species on several trips and on 11 June 1955 described a cormorant with “bill and pouch yellow” that would seem to be this species.

Brandt's Cormorant (*Phalacrocorax penicillatus*)

Resident. Seen regularly in small numbers along the entire east side of the island but commonest near the southern end, where a few pairs breed on outer islet (McLellan 1926, Crossin MS), and on Islote Zapato (Hubbs notes, Jehl *pers. obs.*). The maximum single count is 20 at I. Zapato on 4 May 1966. We suspect that the entire island population does not exceed 30–40 individuals. Specimens in SDNHM.

Pelagic Cormorant (*Phalacrocorax pelagicus*)

J. Sefton reported this species on Hubbs' expedition of 27 January–3 February 1950 (Hubbs field notes). His identifications were doubted by Hubbs, and by us.

Magnificent Frigatebird (*Fregata magnificens*)

Sightings of an immature on 1 and 4 July 1973 (Pierson and Riedman, MS) probably represent the same individual.

Great Blue Heron (*Ardea herodias*)

Probably a rare but regular winter visitor. Hubbs saw one or more on five different trips (maximum three, two trips), between November and February. Other records are: 1, September 1896 (Gaylord 1897); 2–3 in summer 1922 (Anthony 1925); and 1, midwinter 1965 (Kenyon MS).

White-fronted Goose (*Anser albifrons*)

Bryant (1887*a*) shot one on 14 January 1885, but it fell over a cliff and could not be recovered.

Brant (*Branta nigricans*)

Mirsky (MS) reported a sick bird at Northeast Anchorage on 22–24 November 1973.

Mallard (*Anas platyrhynchos*)

Hubbs saw several and collected single males on 13 and 17 December 1957 (LACMNH).

Northern Pintail (*Anas acuta*)

Pitman saw one 40 km north of the island on 11 October 1979.

Blue-winged Teal (*Anas discors*)

Hubbs reported collecting an adult male on 30 October 1957. The location of the specimen, if preserved, is unknown.

Cinnamon Teal (*Anas cyanoptera*)

Jehl saw a male swimming along the shore of the main island on 21 January 1970.

Lesser Scaup (*Aythya affinis*)

Hubbs' field notes list "a female or immature male" several kilometers from the island on 22 November 1964.

Red-breasted Merganser (*Mergus serrator*)

This species probably is an occasional winter visitor. There are two records: 28 January 1950 (Hubbs), and 13–17 December 1973 (Mirsky MS).

Osprey (*Pandion haliaetus*)

Status uncertain. Ospreys have nested on many islands along the Baja California peninsula and perhaps formerly bred on Guadalupe, although proof is lacking. Specimens were collected 11 July 1922 (Anthony 1925, Hanna 1925) and on 25 July 1941 (Bond and Meyer de Schauensee 1944). Kenyon (MS) visited Guadalupe early in 1965 and saw no Ospreys but reported two presumed nests near the north end of the island. There are no other reports or indications of the species' presence.

Red-tailed Hawk (*Buteo jamaicensis*)

Formerly resident in small numbers. Howell and Cade (1954) considered it "apparently resident until at least 1932," but none of the early explorers were able to find any nests. Palmer (*in* Bryant 1887*a*) considered it as common as the caracara. Thayer and Bangs (1908) and Anthony (1925) reported that three or four could be seen in a day; Hanna (1925) also considered it common. This hawk wanders to many offshore islands in fall migration and probably reaches Guadalupe infrequently. However, we know of no recent reports for any season, and it is not resident at this time.

Crested Caracara (*Polyborus plancus lutosus*)

Extinct; formerly resident in small numbers. The detailed history of this endemic form and its taxonomy have been reviewed by Abbott (1933) and Brown and Amadon (1968).

American Kestrel (*Falco sparverius*)

Resident in small numbers. Bryant (1887*a*) stated that they were found most often in the central and higher portions of the islands. Howell and Cade (1954) reported a pair with young on a cliff overlooking the sea at Northeast Anchorage; other birds were in the area. In recent years the species has been seen regularly near Northeast Anchorage and at the southern end of the island. D. A. Duncan (*pers. comm.*) visited Guadalupe 19–26 August 1981 and reported it as common everywhere, one or two being seen at

most localities. The Guadalupe population was described as an endemic race (*guadalupeensis*) by Bond (1943); its validity was accepted by the AOU Check-list (1957) though not by the Mexican Check-list (Friedmann, Griscom, and Moore 1950).

Peregrine Falcon (*Falco peregrinus*)

This large, maritime falcon is likely to have occurred regularly during migration, but we know of only one report, a single bird seen on 19 September 1896 (Gaylord 1897).

Prairie Falcon (*Falco mexicanus*)

Bryant (1889) reported that the species was seen on “two or three occasions” in 1886, but we suspect that these sightings pertain to the Peregrine Falcon.

Pacific Golden Plover (*Pluvialis fulva*)

Jehl saw a flock of 20, two km north of the settlement at the south end on 22 February 1969. Mirsky (MS) reported from 1 to 12 birds along the shore at Northeast Anchorage from 23 November–16 December 1973. Presumably all records of golden plovers pertain to this species (see Connors 1983).

Killdeer (*Charadrius vociferus*)

Hubbs reported two on 13 December 1957.

Willet (*Catoptrophorus semipalmatus*)

The only report is a single bird observed between 10–14 February 1977 (E. Chu).

Wandering Tattler (*Heteroscelus incanus*)

This is a regular visitor to the island from fall through spring; there is one summer record. One or two, often more, are seen on most trips.

Ruddy Turnstone (*Arenaria interpres*)

Though not reported by Howell and Cade (1954), this species is a regular visitor in small numbers. There are specific records for June, November–January, and April. At least three were present in November 1964 (Hubbs). Hubbs also collected several specimens, the location of which is not known.

Black Turnstone (*Arenaria melanocephala*)

Uncommon but regular in migration and during the winter. There are records for October–February, and April. The maximum count is seven on 20–26 January 1970 (Hubbs, Jehl). Specimen LACMNH.

Sanderling (*Calidris alba*)

Two were seen on 22 January 1970 (Jehl).

Western Sandpiper (*Calidris mauri*)

One was photographed at Northeast Anchorage on 16 April 1978 (Everett).

Short-billed Dowitcher (*Limnodromus griseus*)

Hubbs collected an immature that landed on his boat about 2 km off the south end of the island on 29 August 1956 (LACMNH).

Common Snipe (*Gallinago gallinago*)

One record, atop the northern end of the island on 8 June 1953 (Howell and Cade 1954).

Red Phalarope (*Phalaropus fulicaria*)

Regular in migration. This phalarope is seen irregularly, sometimes in fair numbers, between November and May; it has also been reported in late June (Thayer and Bangs 1908).

Jaegers (*Stercorarius* spp.)

Jaegers certainly occur near the island during migration, but the only published record seems to be that of Gaylord (1897), who reported two Long-tailed Jaegers (*S. longicaudus*) on 17 September 1896. Pitman has seen several jaegers in the area in January, and identified a Pomarine (*S. pomarinus*) on 4 January 1980.

Heermann's Gull (*Larus heermanni*)

Two adults were photographed by S. Leatherwood in January 1973 (photo HSWRI).

Ring-billed Gull (*Larus delawarensis*)

Jehl and R. DeLong saw one immature at Northeast Anchorage on 22 January 1970. This species rarely ventures beyond the coastal beaches. Hubbs reported "a few" on 28 January 1950, but his identification seems questionable.

California Gull (*Larus californicus*)

Though not recorded by Howell and Cade (1954), this gull is a regular, sometimes common, winter visitor. It avoids the elephant seal beaches, because of competition with the larger gulls, and tends to occur at sea. Twenty in February 1978 (Chu et al. MS) is the largest number recorded (but *see* Herring Gull).

Herring Gull (*Larus argentatus*)

Common winter visitor from November–April, at times being as common as the Western Gull. Hubbs reported that it was by far the commonest gull in January–February 1950, and counted 360 at the south end of the island in late January 1960. However, we suspect that many of these were California Gulls, for at that season Herring Gulls congregate near the elephant seal rookeries.

Thayer's Gull (*Larus thayeri*)

Uncommon but regular winter visitor. There are several records, all for immature or sub-adult birds; 21 February 1969, 16 April 1970, 30 January 1971 (3) and 15 March 1971 (Devillers et al. 1971).

Western Gull (*Larus occidentalis*)

This species is resident at Guadalupe. Hubbs recognized that the local population differed slightly from the mainland birds. There are minor differences in the color of the fleshy parts (Howell and Cade 1954) and also in the pattern of the primary markings. Hubbs (1960) suggested that it might represent an endemic race, but no formal analysis of the variation has been attempted. In winter the local population is probably enhanced by representatives from the mainland, as both Hubbs and Jehl have seen many birds with pinkish (rather than whitish) legs at that season.

In Jehl's opinion the population in 1969–71 consisted of only 30–40 pairs. Crossin (MS) reported that the species is "rather sparse," and guessed that the local population

in June was no larger than 200 birds. Jehl found a nest with three eggs near the old Lobster Camp on 21 May 1971, and Crossin reported another on Islote Afuera on 20–23 June 1968. In contrast to mainland gulls, the Guadalupe birds nest singly, well back from the shore, and there is no evidence of colonies. In November–December 1973, Mirsky reported 100 at the Northeast Anchorage; all had whitish legs. Chu et al. (MS) counted 100–125 along the entire eastern shore of the island in February 1978, and noted that adults outnumbered juveniles by about 10:1. Pierson and Riedman (MS) reported at least 100 birds during a circumnavigation in the first week of July 1977, most of which were attending nests; at least 15 large nestlings were seen.

Bryant (1887a) was told that gulls nested commonly at the southern end of the island, “where they were not so frequently molested by the ‘Quelelis’” (=Caracaras).

Glaucous-winged Gull (*Larus glaucescens*)

Regular winter visitor, most frequently reported at the Northeast Anchorage in January–March, when they and other gulls feed on elephant seal remains and placentas. Up to 25, adults and immatures, have been seen at that time (Kenyon, MS). There are records from November–May, the latest being 1 May 1967 (Hubbs).

Black-legged Kittiwake (*Rissa tridactyla*)

The Kittiwake occurs in winter; it is common in some years, absent in others. Flocks of up to 100 were seen around the island on 20–26 January 1970 by Hubbs and Jehl.

Sabine's Gull (*Xema sabini*)

This migrant is probably uncommon but regular in spring and fall. Hubbs reported 10 birds 5 km east of the island on 26 April 1967. An additional report, on 27 January 1950 (Hubbs) almost certainly pertains to an immature kittiwake.

Royal Tern (*Sterna maxima*)

Gaylord (1897) reported one near the island on 17 September 1886.

Arctic Tern (*Sterna paradisaea*)

This species certainly occurs regularly off the coast of Baja California, but there are few records. Pitman identified one near the island on 11 October 1979 and saw a second tern, probably of the same species.

Xantus Murrelet (*Synthliboramphus hypoleuca*)

This small alcid breeds on at least two of the small islets at the southern end of the main island; the nesting grounds were discovered by Hubbs. Crossin (MS) estimated the Islote Negro population at 800 birds (300 non-breeding) and the Islote Afuera population at 4000 birds (1000 non-breeding) in June 1968. In 1977 remains of nine birds were found in caves along cliffs at the east side of the island (Pierson and Riedman MS), which suggests the possibility of a mainland breeding locale.

The species occurs near the islands from late December through August, and many fly aboard ships at night. The birds apparently first visit the nesting grounds in February. Hubbs found none on the islands between October and January (five trips total) but found fresh eggs as early as 5 March. The peak of the breeding season is late April–June. Yet, the breeding season may be protracted, as Hubbs found fresh eggs as late as 29–30 August. Brownell (MS) reported that “adequate nesting grounds on the small islots off Guadalupe are almost fully utilized.” If so, nest site limitation would be a strong selective agent for an expanded breeding season, as has apparently occurred in Leach's Storm-Petrels.

Geographic variation in the species has been discussed by Jehl and Bond (1975); the local form is *S. h. hypoleuca*.

Cassin's Auklet (*Ptychoramphus aleuticus*)

Although many ornithologists have noted this species at Guadalupe, particularly near the southern end of the island (e.g., Thayer and Bangs 1908), it remained for Hubbs to discover the nesting area on Islote Negro. The species is not known to nest on Islote Afuera (Crossin MS). Brownell (MS) estimated the population at 200 pairs in April 1968, a figure that is supported by Hubbs' and Jehl's data.

Hubbs and associates banded many birds on I. Negro. In 1968 Brownell banded 56 and recovered two that had been banded two years earlier, one as an adult and one as a downy chick. Other banded birds were recovered in April 1970 (Jehl *pers. obs.*), but details are not available.

The breeding season begins in January. Hubbs reported nests with fresh eggs on 30 January. The peak in laying occurs by April and by late April many nests may contain young. There is annual variation in the nesting period. For example, on 19 April 1957 Hubbs reported numerous burrows, fresh eggs, eggs with embryos, newly hatched young, and well-developed young; on 23 April 1963, 27 nests contained only downy young. In most years nesting is completed by late June. On 13 June 1955 Hubbs found young ready to fledge. On 22 June 1968, most of the colony had completed nesting; 85 adults and 40 chicks were present (Crossin MS).

Rhinoceros Auklet (*Cerorhinca monocerata*)

Probably an irregular winter visitor. There are records for 19 April 1925 (McLellan 1926), 9 February 1957 (Hubbs, specimen LACMNH), and 4 January 1980 (Pitman).

Rock Dove (*Columba livia*)

According to Hubbs, the species was introduced to the island in 1956 by residents of the settlement. Kenyon (MS) reported 20 at the weather station in 1965. In 1977 flocks of up to six were recorded at Twin Canyons and the Lobster Camp (Pierson and Riedman MS). Six were seen in the village (along with a peafowl [*Pavo cristatus*]), on 5 May 1980 (Everett), and Duncan reported 15–20 there on 19–26 August 1981.

White-winged Dove (*Zenaida asiatica*)

A specimen of *Z. a. mearnsi* was collected on 10 June 1953 (Howell and Cade 1954).

Mourning Dove (*Zenaida macroura*)

This species was considered accidental by Howell and Cade (1954), perhaps based on the report of Gaylord (1897). It has since colonized the island. Hubbs made the following observations: 31 August 1956—1; 23 November 1964—1; 10–14 February 1967—24 near the Lobster Camp. By 1970 the species was widespread. Jehl found a nest with two young near the village on 14 April and found a pair, almost certainly with a nest, at the Lobster Camp on 16 April. Another pair was present on Islote Negro on 18 April. In November–December 1973, Mirsky (MS) reported a few at Northeast Anchorage and 30 or more near springs. In August 1981, D. Duncan (*pers. comm.*) estimated the population to be in the low hundreds.

Great Horned Owl (*Bubo virginianus*)

The presence of large owls has not been verified. Bryant (1887a) reported that "Dr. Palmer's assistant" stated that a large owl (*Bubo*) was present on the island, and further noted that the Mexican inhabitants reported hearing "hooting" at night. They said, however, that the owl was very rare. Ridgway (1876) also noted that "two kinds of

owls were seen” by the Palmer party but that no specimens were taken. In 1981, the base commander told D. Duncan of large owls in the canyons to the south of the airstrip.

Burrowing Owl (*Athene cunicularia*)

This small owl is widespread and common on the main island; it also occurs on Isote Negro. The island population is indistinguishable from the mainland form (*A. c. hypugaea*) (Thayer and Bangs 1908).

Vaux's Swift (*Chaetura vauxi*)

One was seen at the Sealer's Camp on 5 May 1980 (Everett).

White-throated Swift (*Aeronautes saxatalis*)

“Regular visitor, at least formerly. Unreported since 1922” (Howell and Cade 1954).

Anna's Hummingbird (*Calypte anna*)

According to Howell and Cade (1954) this hummingbird was evidently uncommon to rare prior to 1953 but shortly thereafter became established in the *Nicotiana* grove at Northeast Anchorage. However, Bryant (1887a) was told that they were common in palms on the northwestern slope and collected one. Howell and Cade (1954) estimated the population at 15–20 birds and called attention to the different song of the local population, a difference subsequently established by Mirsky (1976). Mirsky estimated the population at approximately 100 individuals. On 19 May 1971, Jehl found a nest with two eggs in a low shrub near the top of the island, in a canyon above Barracks Beach.

Allen's Hummingbird (*Selasphorus sasin*)

Power (1972) incorrectly listed this species as breeding. We know of no evidence for its occurrence.

Belted Kingfisher (*Ceryle alcyon*)

Although not listed by Howell and Cade (1954), the kingfisher is an uncommon but regular winter visitor. Between 1957–1969, Hubbs had eight records (nine individuals) between 25 October and 20 April. It has since been reported almost annually (many observers).

Northern Flicker (*Colaptes auratus rufipileus*)

This endemic race was formerly resident in the forested areas atop the island but is now probably extinct. Habitat depletion and predation by cats have been considered the responsible agents. Apparently it was fairly common and as late as 1906, when last seen, the population was reported as “not more than forty individuals” (Thayer and Bangs 1908). The history of this local population has been reviewed by Greenway (1967); see also Grinnell (1928).

There are recent reports of flickers at Guadalupe. K. Briggs (*pers. comm.*) reported the species in the pine forest on 17–18 December 1972, and Mirsky (MS) saw one at Northeast Anchorage in late November–early December 1973; whether these are fall migrants from the mainland or remnants of the endemic population is unresolved.

Least Flycatcher (*Empidonax minimus*)

Accidental. A specimen of this eastern species was taken on 25 October 1962 (Stager, specimen LACMNH).

Say's Phoebe (*Sayornis saya*)

The only report is of eight at Northeast Anchorage in November–December 1973 (Mirsky MS).

Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)

Single birds were seen on 23 November 1964 (Hubbs) and on 18 May 1971 (Jehl).

Barn Swallow (*Hirundo rustica*)

Two seen on 19 May 1971 (Jehl) were presumed to be migrants.

Clark's Nutcracker (*Nucifraga columbiana*)

In the invasion year of 1972, at least one nutcracker was observed in the pine forest at the north end of the island on 17–18 December (K. Briggs *pers. comm.*).

Red-breasted Nuthatch (*Sitta canadensis*)

This nuthatch is resident in small numbers in the pine woods at the north end of the island. In 1971 Jehl found five pairs there, and on 12–13 April 1970 he observed two pairs feeding young and found an additional nest. It occurred in the cypress grove in 1953 (Howell and Cade 1954) and probably still does.

Rock Wren (*Salpinctes obsoletus guadalupensis*)

This endemic race is abundant in all open areas of the island, from the beach to the crest; it is much less common in forested areas. In 1981, in one open area on top of the island, D. Duncan counted one wren per 50 m in a 20 m wide transect. There are no current estimates of numbers, but the total population is certainly in the thousands.

Bewick's Wren (*Thryomanes bewickii brevicauda*)

Extinct, last seen in 1892 (Anthony 1901). The history of this endemic form has been reviewed by Grinnell (1928) and Greenway (1967). It resided in brushy areas and pines, but was never numerous. Habitat depletion by goats and predation by cats caused its demise.

Ruby-crowned Kinglet (*Regulus calendula obscurus*)

This endemic race formerly nested in the cypress grove as well as in the pine forest, and apparently was fairly common. Howell and Cade (1954) reported five singing males in the cypress grove on 11 June 1953. Mirsky (MS) reported five in the cypress grove, two in the pine-oak grove, and one in the *Nicotiana* (presumably near the beach) in November–December 1973. However, birds seen in winter could be migrants and the current status of the endemic population requires verification.

Mountain Bluebird (*Sialia currucoides*)

Three wintered on Guadalupe in 1885–86; one was collected (Bryant 1887a).

Townsend's Solitaire (*Myadestes townsendi*)

One seen on 22 March 1897 (Kaeding 1905) is the only record.

Hermit Thrush (*Catharus guttatus*)

Bryant (1887a) collected three in the cypress woods between December 1885 and March 1886. The race has not been verified (Miller et al. 1957).

American Robin (*Turdus migratorius*)

Bryant (1887a) saw several in December–January 1886–87 in the cypress grove. Mirsky (MS) saw one at Northeast Anchorage on 5 December 1973.

Varied Thrush (*Ixoreus naevius*)

One was observed in the pine forest on 4 March 1886 (Bryant 1887a).

Northern Mockingbird (*Mimus polyglottos*)

Considered accidental by Howell and Cade (1954), apparently on the basis of a report by Bryant (1887a), who saw two and collected one on 16 March 1886. One was described to Jehl on 22 February 1969.

Sage Thrasher (*Oreoscoptes montanus*)

One was collected on 7 January 1886 (Bryant 1887a).

Water Pipit (*Anthus spinoletta*)

This pipit is probably rare but regular in migration. Bryant reported a flock of 25 on 2 February 1886 (Bryant 1887a).

Cedar Waxwing (*Bombycilla cedrorum*)

Bryant (1887a) collected one in the winter of 1885–86.

Loggerhead Shrike (*Lanius ludovicianus*)

Bryant (1887a) saw two and collected a female that had fed on a Ruby-crowned Kinglet on 29 December 1885. The other bird was heard singing, which suggests the possibility of a mated pair.

European Starling (*Sturnus vulgaris*)

On 15 May 1971, Jehl saw one at the settlement at the south end of the island, and on 18 May found three in the pine forest at the north end of the island.

Yellow-rumped (Audubon's) Warbler (*Dendroica coronata*)

This warbler is probably a regular winter visitor. It was first reported by Bryant (1887a) and has been seen by many observers. Mirsky (MS) reported up to 30 in November–December 1973 at Northeast Anchorage. Everett saw an example of the eastern race (*D. c. coronata*) on 18 April 1979.

Townsend's Warbler (*Dendroica townsendi*)

Mirsky (MS) reported three in the pine-oak woods on 6 December 1975.

Black-and-white Warbler (*Mniotilta varia*)

One in the pine forest, 19 May 1971 (Jehl).

Ovenbird (*Seiurus aurocapillus*)

A specimen of *S. a. aurocapillus* was collected on 9 June 1953 (Howell and Cade 1954). The late date is typical for eastern vagrants on the west coast in spring.

Common Yellowthroat (*Geothlypis trichas*)

One was collected on 12 November 1938 (Huey 1954).

Wilson's Warbler (*Wilsonia pusilla*)

Probably regular in migration but there are only two records; 18 May 1971 (Jehl) and 18 April 1979 (Everett).

Summer Tanager (*Piranga rubra*)

A specimen of the eastern race (*P. r. rubra*) was collected in the cypress grove on 12 October 1913 (Kimball 1922).

Rose-breasted Grosbeak (*Pheucticus ludovicianus*)

Two records, 24 October 1962 (Stager, specimen LACMNH) and 5 December 1973 (Mirsky, specimen UCLA).

Black-headed Grosbeak (*Pheucticus melanocephalus*)

The wing of a male was found on the east side of the island on 29 June 1977 (Pierson and Riedman MS).

Guadalupe Rufous-sided Towhee (*Pipilo erythrophthalmus consobrinus*)

Extinct. The history of this endemic race has been summarized by Grinnell (1928) and more fully by Greenway (1967). It was known to occur in the cypress grove and perhaps elsewhere, and was last observed in 1897. Its extinction was due to habitat depletion by goats and predation by cats.

Chipping Sparrow (*Spizella passerina*)

Bryant (1887a) collected one on 6 January 1886, and Mirsky (MS) reported the species in the *Nicotiana* and in the pine-oak forest in November–December 1973.

Fox Sparrow (*Passerella iliaca*)

An example of *P. i. sinuosa* collected on 16 February 1886 (Bryant 1887a), seems to represent the southernmost record for the species on the Pacific coast.

Lincoln's Sparrow (*Melospiza lincolni*)

Bryant (1887a) collected individuals on 5 and 19 February 1886, and Swarth (1933) reported a specimen taken on 16 March 1932.

White-throated Sparrow (*Zonotrichia albicollis*)

One collected, 10 October 1913 (Kimball 1922).

Golden-crowned Sparrow (*Zonotrichia atricapilla*)

Bryant (1887a) collected two on 16 February and one on 4 March 1886, in the pines.

White-crowned Sparrow (*Zonotrichia leucophrys*)

Probably regular in migration but the only report is of two near the south end of the island on 14 April 1970 (Jehl).

Guadalupe Dark-eyed Junco (*Junco hyemalis insularis*)

Knowledge of this endemic junco was fully summarized by Howell (1968); additional information, including variation in the song, was provided by Mirsky (1976). At one time the junco was one of the most abundant birds on the island (Palmer, in Ridgway 1876). Today it is uncommon and is much less abundant than the House

Finch or Rock Wren. It may be found scattered along the northern half of the island wherever there is vegetation. It often feeds on the ground, in litter at the base of pine trees but also in the oaks. However, it seems adaptable and now occupies stands of *Nicotiana* on the beach. Breeding occurs from late January (Bryant 1887a) to at least late April (Howell 1968). On 17 May 1971 Jehl saw young juncos that were independent of the parents. The taxonomic relationships of this junco have been fully discussed by Miller (1941), who argued that the local population was derived from migratory ancestors. "The Guadalupe junco is distinguished principally by its relatively long bill and short wing and tail . . . and virtual absence of sexual dimorphism in color" (Howell 1968). The long bill is used to extract seeds from deep in pine cones (Jehl *pers. obs.*). Power (1980) also discussed the morphology of this species. Bryant (1887a) collected a migrant of one of the mainland races (*thurberi*?, cf. Miller et al. 1957) on 6 January 1886, that was being attacked by a resident junco.

Western Meadowlark (*Sturnella neglecta*)

Bryant (1887a) reported one on the crest of the island on 22 March 1886.

Brewer's Blackbird (*Euphagus cyanocephalus*)

A female was seen on 12 December 1973 (Mirsky MS).

Scott's Oriole (*Icterus parisorum*)

Mirsky (MS) reported two males and three females in the *Nicotiana* at Northeast Anchorage from 23 November to 3 December 1973.

Guadalupe House Finch (*Carpodacus mexicanus amplus*)

This endemic, the second commonest landbird, may occur almost anywhere, including Islote Negro, but is most common near vegetation and at the village. The entire population may exceed 1000. Bryant (1887a) provided information on nests and nest sites. He also noted that the finches were captured and eaten by locals. The evolution and geographic variation of this race have been reviewed by Power (1979).

Red Crossbill (*Loxia curvirostra*)

Howell and Cade (1954) reported this species as "formerly resident; no definite breeding record; unreported since 1903." Evidently it was once fairly common as Bryant (1887a) reported about 20 in the pines in 1886, and reported collecting nine specimens, including an immature in February–March 1896. According to K. C. Parkes, six birds collected by A. W. Anthony on 20 September 1896 include a female almost molted out of juvenile plumage and five full-grown juveniles. The species was also reported as being "resident" by Gaylord (1897), though he did not observe it. Kaeding (1905) reported "a few" in 1897. Grinnell (1928) reviewed the status of the species and examined the specimens, which he attributed to *L. c. bendirei*. A. R. Phillips, however, now refers all specimens to *L. c. benti* (*fide* K. C. Parkes).

Goldfinch (*Carduelis* sp.)

Townsend (1916) states "the Goldfinch was observed." There is no additional information.

DISCUSSION

The Guadalupe avifauna was well-studied in the late 19th and early 20th centuries. Recent studies have provided new information on seabirds; yet, much remains to be learned. The known colonies are difficult to reach and most visits to them have been made in winter or spring. Studies during other seasons are needed to clarify breeding

seasons. Efforts are also needed to locate seabird colonies on the main island, especially in light of recent reports of storm-petrels calling there at night, and to determine the morphological characters of any such populations. It is not inconceivable that the Guadalupe Storm-Petrel has escaped extinction.

The island's rugged topography and lack of fresh water have inhibited recent work along the central axis. Surveys in forested areas during the breeding season are needed to determine the status of the endemic races of the Ruby-crowned Kinglet and Northern Flicker. Both species are common on the mainland and highly migratory, so sight records are not proof of the persistence of endemic races. Even evidence of breeding may be equivocal, as secondary invasions by these species could have taken place. These studies will be difficult and will require capturing or collecting some birds.

Faunas of oceanic islands are not constant. New species arrive regularly; some become established, and others disappear. The factors that affect successful colonization or promote extinction are difficult to establish (Jehl and Parkes 1983) but are critical to understanding avian distribution. On Guadalupe, a new food source (*Nicotiana glauca*), may have been a major factor in allowing Anna's Hummingbirds to colonize (or become more common?) in the past several decades. Mourning Doves have also become established, though the reasons why are unstudied.

In view of the importance of island faunas to current theories in biogeography, regular surveys should be encouraged (e.g., at least every decade) so that changes can be detected as they are occurring or shortly afterward. Such data will be especially useful from islands, like Guadalupe, where a strong historical record has been established.

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LITERATURE CITED

- Abbott, C. G. 1933. Closing history of the Guadalupe Caracara. *Condor* 35:10-14.
- Ainley, D. G. 1980. Geographic variation in Leach's Storm-Petrel. *Auk* 97:837-853.
- . 1983. Further notes on variation in Leach's Storm-Petrel. *Auk* 100:230-233.
- American Ornithologists' Union. 1957. Check-list of North American Birds. Fifth Edition. Lord Baltimore Press, Baltimore, Maryland.
- . 1983. Check-list of North American Birds. Sixth Edition. Allen Press, Lawrence, Kansas.
- Anon. 1874. Guadalupe. La isla de la piel de oro, sin duda alguna. *Forest and Stream* 2(22):337-338.
- Anthony, A. W. 1898a. Two new birds from the Pacific coast of America. *Auk* 15:36-38.
- . 1898b. Four sea birds new to the fauna of North America. *Auk* 15:38-39.
- . 1898c. Petrels of Southern California. *Auk* 15:140-144.
- . 1900. Nesting habits of the Pacific Coast species of the genus *Puffinus*. *Auk* 17:247-252.
- . 1901. The Guadalupe Wren. *Condor* 3:73.
- . 1925. Expedition to Guadalupe Island, Mexico, in 1922. The birds and mammals. *Proceedings California Academy Sciences, Series 4* 14:277-320.
- Austin, O. L., Jr. 1952. Notes on some petrels of the North Pacific. *Bulletin Museum Comparative Zoology*. 107:391-403.
- Bent, A. C. 1922. Life histories of North American petrels and pelicans and their allies. United States National Museum Bulletin 121.
- Blake, S. F. 1961. Edward Palmer's visit to Guadalupe Island, Mexico, in 1875. *Madrono* 16:1-4.
- Bond, J., and R. Meyer de Schauensee. 1944. Fifth George Vanderbilt Expedition (1941). Academy Natural Sciences Philadelphia Monograph 6.
- Bond, R. M. 1943. Variation in western sparrow hawks. *Condor* 45:168-185.
- Bourne, W. R. P., and J. R. Jehl, Jr. 1982. Vari-

- ation and nomenclature of Leach's Storm-Petrel. *Auk* 99:793-797.
- Brown, L., and D. Amadon. 1968. *Eagles, Hawks and Falcons of the World*. 2 vols. McGraw-Hill, New York.
- Brownell, R. L., Jr. MS. Preliminary report eastern area cruise number 40, Isla Guadalupe [1968]. Smithsonian Institution, Pacific Ocean Biological Survey Program. 8 pp.
- Bryant, W. E. 1887a. Additions to the ornithology of Guadalupe Island. *Bulletin California Academy Sciences Series 2* 2:269-318.
- . 1887b. Description of a new subspecies of petrel from Guadalupe Island. *Bulletin California Academy Sciences, Series 2* 2:450-451.
- . 1889. A catalogue of the birds of lower California, Mexico. *Proceedings California Academy Sciences, Series 2* 2:237-320.
- Chu, E. W., B. Tyler and D. Lewis. MS. Avian notes. pp. 12-31 in M. Pierson (ed.). Report of a Scripps Institution of Oceanography Expedition to Baja California Islands, 9-20 Feb. 1978.
- Connors, P. G. 1983. Taxonomy, distribution, and evolution of Golden Plovers *Pluvialis dominica* and *Pluvialis fulva*. *Auk* 100:607-620.
- Crossin, R. S. MS. Preliminary report of Guadalupe Island [1968]. Smithsonian Institution, Pacific Ocean Biological Survey Program. 8 pp.
- . 1974. The storm-petrels (*Hydrobatidae*). pp. 154-205 in W. B. King (ed.). *Pelagic studies of seabirds in the Central and Eastern Pacific Ocean*. Smithsonian Contributions Zoology 158.
- Davidson, M. E. McLellan. 1928. On the present status of the Guadalupe petrel. *Condor* 30:355-356.
- DeLong, R. L. and R. S. Crossin. MS. Status of seabirds on Islas de Guadalupe, Natividad, Cedros, San Benitos, and Los Coronados.
- Devillers, P., G. McCaskie, and J. R. Jehl, Jr. 1971. The distribution of certain large gulls (*Larus*) in southern California and Baja California. *California Birds* 2:11-26.
- duPetit-Thouars, A. 1956. Voyage of the *Venus* Sojourn in California. Excerpt from "Voyage autour du monde sur la fregate *Venus* pendant les années 1836-1839. Translated by C. N. Rudkin. Los Angeles, Glen Dawson Press.
- Emerson, W. O. 1906. *Oceanodroma leucorhoa* and its relatives on the Pacific coast. *Condor* 8:53-55.
- Friedmann, H., L. Griscom, and R. Moore. 1950. Distributional check-list of the birds of Mexico. *Pacific Coast Avifauna* 29.
- Gaylord, H. A. 1897. Notes from Guadalupe Island. *Nidologist* 4:41-43.
- Godman, F. D. 1907-1910. A monograph of the petrels. Witherby, London.
- Greenway, J. C. 1967. *Extinct and Vanishing Birds of the New World*. Dover Publications. New York.
- Grinnell, J. 1918. The status of the white-rumped petrels of the California coast. *Condor* 20:46.
- . 1928. A distributional summation of the ornithology of Lower California. University California Publications Zoology 32(1):1-300.
- Hanna, G Dallas. 1925. Expedition to Guadalupe Island, Mexico, in 1922. General Report. *Proceedings California Academy Sciences Series 4* 14:217-275.
- Howell, T. R. 1968. Guadalupe Junco. pp. 1094-1098 in A. C. Bent et al. (O. L. Austin, Jr. [ed.]). *Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and allies*. United States National Museum Bulletin 237.
- , and T. J. Cade. 1954. The birds of Guadalupe Island in 1953. *Condor* 56:283-294.
- , and ———. 1955. Additional data on the birds of Guadalupe Island. *Condor* 58:78.
- Hubbs, C. L. 1960. The marine vertebrates of the outer coast. *Systematic Zoology* 9:134-147.
- , and J. R. Jehl, Jr. 1976. Remains of Pleistocene birds from Isla de Guadalupe, Mexico. *Condor* 78:421-422.
- Huey, L. M. 1924. A trip to Guadalupe, the isle of my boyhood dreams. *Natural History* 24: 578-588.
- . 1925. Guadalupe Island: an object lesson in man-caused devastation. *Science* 61:405-407.
- . 1930. Notes on the habits and plumage of young Kaeding Petrels. *Condor* 32:68-69.
- . 1952. *Oceanodroma tethys tethys*, a petrel new to the North American avifauna. *Auk* 69: 460-461.
- . 1954. Notes from Southern California and Baja California, Mexico. *Condor* 56:51-52.
- Jehl, J. R., Jr. 1972. On the cold trail of an extinct petrel. *Pacific Discovery* 25(6):24-29.
- , and S. I. Bond. 1975. Morphological variation and species limits in murrelets of the genus *Endomychura*. *Transactions San Diego Society Natural History* 18:9-23.
- , and K. C. Parkes. 1983. "Replacements" of landbird species on Socorro Island, Mexico. *Auk* 100:551-559.
- Johnson, C. W. 1953. Notes on the geology of Guadalupe Island, Mexico. *American Journal Science* 251:231-236.
- Kaeding, H. B. 1905. Birds from the west coast of Lower California and adjacent islands. *Condor* 7:105-138.
- Kenyon, K. W. MS. Expedition to Baja California, Mexico 19 Jan.-11 Feb. 1965. Unpublished report to U.S. Fish and Wildlife Service.
- Kimball, H. H. 1922. Bird records from California, Arizona, and Guadalupe Island. *Condor* 24:96-97.
- Lewis, L. R. 1971. *Baja Sea Guide*, Vol. 2. Miller Freeman Publications, San Francisco.
- Lindsay, G. 1966. Guadalupe Island. *Pacific Discovery* 19:2-11.
- Loomis, L. M. 1918. Expedition of the California Academy of Sciences to the Galapagos Islands, 1905-1906. 12. A review of the albatrosses, petrels, and diving petrels. *Proceedings California Academy Sciences Series 4* 2:1-187.
- Madden, H. M. 1949. *Xantus, Hungarian naturalist in the pioneer west*. Palo Alto, California. Books of the West.
- McLellan, M. E. 1926. Expedition to the Revillagigedo Islands, Mexico, in 1925. VI. The birds

- and mammals. *Proceedings California Academy Sciences Series 4* 15:279-322.
- Miller, A. H. 1941. Speciation in the avian genus *Junco*. *University California Publications Zoology* 44:173-434.
- Miller, A. H., H. Friedmann, L. Griscom, and R. T. Moore. 1957. Distributional check-list of the birds of Mexico. *Pacific Coast Avifauna* No. 33.
- Mirsky, E. N. MS. The Guadalupe Island avifauna in 1973.
- . 1976. Song divergence in hummingbird and junco populations on Guadalupe Island. *Condor* 78:230-235.
- Oberholser, H. C. 1917. A review of the subspecies of the Leach Petrel, *Oceanodroma leucorhoa* (Vieillot). *Proceedings United States National Museum* 54:165-172.
- Palmer, R. S. (ed.). 1962. *Handbook of North American Birds*. Vol. 1. Yale University Press, New Haven and London.
- Pierson, M., and M. Riedman MS. Report of an expedition to Isla de Guadalupe, Baja California, Mexico 20 June-13 July 1977. Unpublished Report, Univ. Calif. Santa Cruz. 15 pp.
- Power, D. M. 1972. Numbers of bird species on the California Islands. *Evolution* 26:451-463.
- . 1979. Evolution in peripheral isolated populations: *Carpodacus* finches on the California Islands. *Evolution* 33:834-847.
- . 1980. Evolution of land birds on the California Islands. pp. 613-650 in D. M. Power (ed.). *The California Islands: Proceedings of a multidisciplinary symposium*. Santa Barbara Museum Natural History.
- , and D. G. Ainley. MS. Similarity among populations of Leach's Storm-Petrels.
- Ridgway, R. 1876. Ornithology of Guadeloupe [sic] Island, based on notes and collections made by Dr. Edward Palmer. *United States Geological and Geographical Survey Territories* 2:183-195.
- Rothschild, W., and E. Hartert. 1902. Further notes on the fauna of the Galapagos Islands. *Notes on birds. Novitates Zoologica* 9:381-418.
- Small, A. 1961. Southern Pacific Coast Region. *Audubon Field Notes*. 15:438. *
- Swarth, H. S. 1933. Off-shore migrants over the Pacific. *Condor* 35:40.
- Thayer, J. E., and O. Bangs. 1908. The present state of the ornithology of Guadalupe (sic) Island. *Condor* 3:101-106.
- Thoburn, W. W. 1899. The birds of Guadalupe Island. p. 278 in D. S. Jordan. *The fur seals and fur-seal islands of the North Pacific Ocean*. Pt. 3. United States Government Printing Office, Washington, D.C.
- Todd, W. E. C. 1955. Taxonomic comment on races of Leach Petrel of the Pacific Coast. *Condor* 57:122.
- Townsend, C. H. 1890. Scientific results of explorations by the U.S. Fish Commission Steamer Albatross, No. XIV.—Birds from the coasts of western North America and adjacent islands, collected in 1888-89, with descriptions of new species. *Proceedings United States National Museum* 13:131-142.
- . 1911. (Account of expedition to lower California). *Auk* 28:390-391.
- . 1916. Voyage of the 'Albatross' to the Gulf of California in 1911. *Bulletin American Museum Natural History* 35:399-476.
- . 1923. Birds collected in Lower California. *Bulletin American Museum Natural History* 48:1-26.
- van Rossem, A. J. 1942. Preliminary comment on some Pacific Coast petrels. *Proceedings Biological Society Washington* 5:9-12.
- von Berlepsch, H. G. 1906. On a new form of *Oceanodroma* inhabiting San Benito Island, off the coast of Lower California. *Auk* 13:185-186.